ENERGY
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CASE KOHINOOR ENERGY: TURBOCHARGER UPGRADE BRINGS ECONOMY INTO PLANT OPERATIONS

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The original turbochargers installed at the Kohinoor power plant in Pakistan had reached their expected service life-cycle. Replacing key components would cause significant costs. Instead of an overhaul, Wärtsilä offered a retrofit solution which would bring higher efficiency and lower fuel oil consumption. A contract was subsequently made to deliver and install eight TPL 76C turbochargers.

– As fuel prices are increasing rapidly, we felt the need to look for higher engine efficiency, good reliability and more generation along with reduced hazardous emissions, states Ghazanfar Ali Zaidi, General Manager (Technical) at Kohinoor Energy Ltd.

Kohinoor Energy Limited (KEL) was founded in 1994 through a joint venture between the Saigols Group, a multi-industrial group from Pakistan, and Toyota Tsusho Corporation, a multi-industrial consortium from Japan. KEL is one of the pioneers of the Independent Power Producers in Pakistan. They own and operate a 124 MW power plant equipped with eight Wärtsilä 18V46 engines having a rated capacity of 15.68 MW each, including a combined cycle heat recovery system capable of delivering 8 MW through a steam turbine.

KEL is connected to the national grid and is located close to Lahore, the 2nd major energy-consuming city of Pakistan. The Kohinoor Energy power plant was originally commissioned in 1997 to meet the peak load demand of the national grid.

– There has, however, been a continuous increase in electricity demand, and for the last ten years KEL has been operating as a base load station, says Ghazanfar Ali Zaidi.

GUARANTEED SPECIFIC FUEL OIL CONSUMPTION SAVINGS

The turbochargers originally installed at the Kohinoor power plant had come to the end of their life-cycle. Since repairing them would have become very costly, KEL had

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“The upgrade has brought economy into our operation and the power plant is now more reliable.”

to start looking for retrofit options instead, which would bring higher efficiency and lower specific fuel oil consumption (SFOC).

The SFOC of the Kohinoor engines were measured by Wärtsilä and calculations were made for the savings after the installation of new turbochargers. Wärtsilä was then able to guarantee SFOC savings of 2.5g/KWh, which turned out to be one of the major reasons for KEL choosing Wärtsilä to supply and install the turbochargers.

– We have had a long-lasting healthy business relationship with Wärtsilä, and since Wärtsilä is an OEM they understand the engines better than anyone else. So because of the guaranteed SFOC savings we decided to go with Wärtsilä, despite the fact that we had received better financial offers from competitors, explains KEL’s Ali Zaidi.

The Challenge	Solution	Benefits
– Improving the fuel efficiency and reliability of the operation, by replacing the existing turbochargers with new ones instead of overhauling – Minimising downtime and affecting plant operation as little as possible in order to prevent liquidated damages – Finding a proper installation method on site – The huge amount of parts needed for the eight retrofits, almost 130,000 kg in total, of which the turbochargers weighed 48,000 kg	– instead of overhauling the eight ABB VTR 564 P32 turbochargers originally installed at the power plant, the engines were retrofitted with the new generation ABB TPL 76C turbochargers	– Extended economic lifetime of the engines – Reduced fuel costs; even better than guaranteed savings for some engines, resulting in lower OPEX – Increased annual capacity and thus a significant increase in plant revenue – Lower turbocharger maintenance costs – Higher reliability

CHALLENGING RETROFIT SCHEDULE MINIMISING DOWNTIME

After the successful installation and trial period of the first turbocharger in December 2012, the remaining seven turbocharger retrofits were completed by the end of December 2013. The retrofit of the remaining seven engines took about 15 days each, which was according to the schedule agreed between KEL and Wärtsilä.

– We had to complete the retrofit on each engine as quickly as possible, in order to avoid liquidated damages from the power purchaser. The completion of one retrofit in less than 15 days was a great challenge. But Wärtsilä really proved to us that they really understand their customer’s needs, says Ali Zaidi.

The first retrofit has now completed almost 8,200 running hours, and the operation has been very satisfactory.

– Wärtsilä guaranteed a 2.5g/KWh reduction in fuel consumption at the alternator terminal, and it really turned out to be so. In addition to that, de-rating the engines due to ambient conditions is now almost zero, says a satisfied Ali Zaidi adding:

– The upgrade has brought economy into our operation in the form of SFOC savings, but also in the form of an annual capacity increase. The Wärtsilä 46 engines in our power plant are now more reliable, producing even more electricity.

Ali Zaidi points out that Wärtsilä has been very supportive after the installation, helping out in issues like water pressure and flow rate adjustments to achieve optimum results.

He also recommends other Wärtsilä customers to do turbocharger upgrades. However, the proper homework must be done first, due to the fact that configurations can be complex and there are limitations set by e.g. power purchase agreements.

– Going for a retrofit at any plant in the world is a good option, but comprehensive studies need to first take into consideration fuel specifications, climatic conditions, previous running hours of machines, fuel injection timings, old maintenance records, etc. But once this has been done, don’t hesitate to do it, concludes Ghazanfar Ali Zaidi.

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